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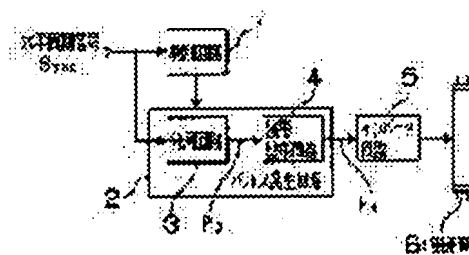
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(54) DRIVING DEVICE AND DRIVING METHOD FOR BACK LIGHT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the driving device and the driving method of a back light capable of obtaining the synchronizing signal of an inverter circuit having a proper frequency and the proper driving power of a fluorescent tube even though the video signal having a different synchronizing frequency is inputted.

SOLUTION: Since a discriminate circuit 1 discriminates the form of a video signal based on the synchronizing frequency of the video signal or the frequency of a horizontal synchronizing frequency Sync and determines a frequency dividing ratio so as to become larger as the frequency of the horizontal synchronizing frequency Sync becomes higher and also the circuit determines the pulse width roughly proportional to the cycle of the horizontal synchronizing frequency sync which is frequency divided, a pulse generating circuit 2 supplies driving pulses Pd having an almost fixed cycle or an almost fixed duty cycle to an inverter circuit 5 regardless of the form of the video signal.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the driving gear and the drive approach of a back light which are used for a liquid crystal display.

[0002]

[Description of the Prior Art] In recent years, many application range to the finder of breadth, a television receiver, or a video camera or the display of a computer of LCD (Liquid Crystal Display: liquid crystal display) is used.

[0003] Moreover, in these applications, almost all the things are equipped with the back light from the reasons of the conspicuousness of a screen etc. now.

[0004] Generally fluorescence tubing (discharge tube) is used for this back light, and high pressure required for discharge is generated when an inverter circuit (alternating current generating circuit) receives supply of the Horizontal Synchronizing signal of a video signal. Since this is shown, for example in JP,3-170910,A etc., detailed explanation is omitted.

[0005]

[Problem(s) to be Solved by the Invention] By the way, there is a thing of various synchronous frequency in the image display used for a personal computer (a computer is only called after this), and, generally this synchronous frequency is determined by the resolution (pixel number) of the display screen etc.

[0006] However, each part of the above-mentioned inverter circuit is constituted supposing the case where the synchronizing signal of a specific frequency is inputted. For this reason, if the synchronous frequency given changes, since a generated voltage changes, the luminescence brightness of fluorescence tubing will change or the conversion loss of power will increase. Moreover, since the burden to specific components increases, fault, like the life of the components which constitute a circuit becomes short occurs.

[0007] This invention was made under such a background, and even if the video signal of different synchronous frequency is inputted, it aims at offering the driving gear and the drive approach of the back light which can obtain the synchronizing signal of the inverter circuit of a suitable frequency, and the drive power of suitable fluorescence tubing.

[0008]

[Means for Solving the Problem] If it is in invention according to claim 1 in order to solve the technical problem mentioned above A distinction means to distinguish the gestalt of a video signal, and a pulse generating means for the Horizontal Synchronizing signal included in said video signal to be supplied, to carry out dividing of the Horizontal Synchronizing signal concerned according to the gestalt of said distinguished video signal, and to generate a driving pulse, It is characterized by providing a high-tension-power generation means to generate high tension power synchronizing with said driving pulse, and a luminescence means to emit light with said high tension power.

[0009] According to this invention, a distinction means distinguishes the gestalt of a video signal, and a pulse generating means is carrying out dividing of the Horizontal Synchronizing signal included in a video signal according to this gestalt, and supplies the driving pulse of about 1 fixed cycle to a high-tension-power generation means regardless of the gestalt of a video signal.

[0010] Moreover, according to invention according to claim 2, with the driving gear of a back light according to claim 1, said pulse generating means is characterized by generating the driving pulse of the pulse width proportional to the period of said Horizontal Synchronizing signal by which dividing was carried out in general.

[0011] According to this invention, a pulse generating means is changing the pulse width of a driving pulse according to the gestalt of the distinguished video signal, and supplies the driving pulse of a fixed duty ratio to a high-tension-power generation means mostly.

[0012] Moreover, according to invention according to claim 3, with the driving gear of a back light given in any of claim 1 or claim 2 they are, said distinction means is characterized by distinguishing the gestalt of said video signal based on the synchronous frequency of said video signal, or the frequency of said Horizontal Synchronizing signal.

[0013] according to this invention, a distinction means distinguishes the gestalt of a video signal based on the synchronous frequency of a video signal, or the frequency of a Horizontal Synchronizing signal -- it is -- the gestalt of a video signal -- not related -- about 1 fixed cycle -- or the driving pulse of a duty ratio is supplied to a high-tension-power generation means about 1 law.

[0014] Moreover, according to invention according to claim 4, a division ratio determines that it will become large as the frequency of the Horizontal Synchronizing signal which a distinction means distinguishes the gestalt of a video signal and the video signal concerned includes becomes high. A pulse generating means carries out dividing of said Horizontal Synchronizing signal according to said division ratio determined by said distinction means, and generates a driving pulse, a high-tension-power generation means generates the high tension power which synchronized with said driving pulse, and it is characterized by a luminescence means emitting light with said high tension power.

[0015] According to this invention, a division ratio determines that it will become large as the frequency of the Horizontal Synchronizing signal which a distinction means distinguishes the gestalt of a video signal and the video signal concerned includes becomes high, and a pulse generating means is this thing [carrying out division ratio dividing] about the Horizontal Synchronizing signal included in a video signal, and supplies the driving pulse of about 1 fixed cycle to a high-tension-power generation means regardless of the gestalt of a video signal.

[0016] Moreover, according to invention according to claim 5, by the drive approach of a back light according to claim 4, said distinction means determines the pulse width proportional to the period of said Horizontal Synchronizing signal by which dividing was carried out by said division ratio in general, and said pulse generating means is characterized by generating said driving pulse of said pulse width determined by said distinction means.

[0017] According to this invention, a distinction means determines the pulse width proportional to the period of the Horizontal Synchronizing signal by which dividing was carried out in general, and a pulse generating means is generating the driving pulse of this pulse width, and supplies the driving pulse of a fixed duty ratio to a high-tension-power generation means mostly.

[0018]

[Embodiment of the Invention] With reference to a drawing, the gestalt of 1 operation of this invention is explained below. Drawing 1 is the block diagram showing the configuration of the driving gear of the back light concerning the gestalt of 1 operation of this invention.

[0019] In drawing 1, 1 is a distinction circuit and consists of the arithmetic circuit section which determines the division ratio mentioned later and pulse width as the timing judging circuit which has a time constant as an example, or a reference table (memory).

[0020] Horizontal Synchronizing signal Sync included in the video signal given to the drive circuit of LCD which is not illustrated is supplied to this distinction circuit 1, and the mode of a video signal is distinguished based on the frequency of this Horizontal Synchronizing signal Sync.

[0021] 2 is a pulse generating circuit and consists of a frequency divider 3 and a waveform shaping circuit 4. This frequency divider 3 consists of programmable counters as an example, carries out dividing by the division ratio to which Horizontal Synchronizing signal Sync was directed by the distinction circuit 1, and outputs a pulse signal P0.

[0022] A waveform shaping circuit 4 consists of a one-shot multivibrator, a time constant circuit, etc. as an example, operates orthopedically the pulse signal P0 which a frequency divider 3 outputs to the pulse width to which it was directed by the distinction circuit 1, and outputs driving pulse Pd.

[0023] 5 is the inverter circuit which consisted of a gate component, a pressure-up transformer, etc. (all are illustration abbreviations). This gate component that is not illustrated makes intermittent the DC power supply supplied to the primary winding of the pressure-up transformer which is not illustrated synchronizing with driving pulse Pd.

[0024] For this reason, high pressure occurs in the secondary winding of an above-mentioned pressure-up transformer. In this way, as for an inverter circuit 5, a cusp value generates the high tension power of the shape of a pulse beyond 500V in general, this is supplied to the fluorescence tubing 6, and the fluorescence tubing 6 emits light.

[0025] Drawing 2 is drawing showing the example of the video signal which may be supplied to the driving gear of the back light of the gestalt of this operation. As shown in this drawing, any one of the video signals of two or more screen modes is supplied to the gestalt of this operation.

[0026] For example, since an active scanning line per frame is [screen mode] about 460 in the case of NTSC mode (the NTSC mode which carried out non-interlaced conversion shall be put in the gestalt of a National Television System Committee method, however this operation) and 460 and the aspect ratio (aspect ratio) of the number of

vertical dots are 3:4, the number of horizontal dots is set to 613. Furthermore, horizontal synchronous frequency is 31.46kHz in this case.

[0027] On the other hand, in the case of SVGA (vertical-synchronous-frequency o'clock of 75Hz) mode, the numbers of dots in every direction are 600 and 800 respectively, and horizontal synchronous frequency is 46.875kHz. That is, horizontal synchronous frequency differs from the case in above-mentioned NTSC mode greatly.

[0028] Then, as shown in drawing 2, the distinction circuit 1 determines a division ratio according to the frequency of Horizontal Synchronizing signal Sync of each screen mode, and supplies it to a pulse generating circuit 2. A frequency divider 3 carries out dividing of Horizontal Synchronizing signal Sync according to this division ratio.

[0029] For example, in the case of above-mentioned NTSC mode, a frequency divider 3 carries out 1 / 2 dividing of the Horizontal Synchronizing signal according to the decision of the distinction circuit 1. For this reason, the pulse signal P0 which a frequency divider 3 outputs is set to 15.73kHz.

[0030] On the other hand, in the case of SVGA (vertical-synchronous-frequency o'clock of 75Hz) mode, a frequency divider 3 carries out 1 / 3 dividing of the Horizontal Synchronizing signal according to the decision of the distinction circuit 1. For this reason, the pulse signal P0 which a frequency divider 3 outputs is set to 15.625kHz.

[0031] Drawing 3 is the timing chart which showed the situation of a video signal and a Horizontal Synchronizing signal, and the situation of a pulse signal P0, drawing 3 (a) shows the case in NTSC mode, and drawing 3 (b) shows the case in SVGA mode.

[0032] in this way, the frequency of the pulse signal P0 which a frequency divider 3 outputs serves as about 1 law (the gestalt of this operation before or after 16kHz) regardless of screen mode, and the burden which an inverter circuit 5 receives by fluctuation of synchronous frequency is reduced.

[0033] Now, the distinction circuit 1 also determines pulse width (pulse-on time amount) according to the frequency of Horizontal Synchronizing signal Sync of each screen mode, as shown in drawing 2, and it supplies it to a pulse generating circuit 2. A waveform shaping circuit 4 outputs driving pulse Pd according to this pulse width.

[0034] For example, when screen mode is VGA (vertical-synchronous-frequency o'clock of 85Hz) mode, horizontal synchronous frequency is 48.269kHz. However, since 1 / 3 dividing are carried out, one period of the pulse signal which a frequency divider 3 outputs becomes about 62.2 microseconds. Moreover, since the pulse width in this case is 9.0 microseconds, the duty ratio of driving pulse Pd is set to about 1:6.9.

[0035] On the other hand, when screen mode is SVGA (vertical-synchronous-frequency o'clock of 60Hz) mode, horizontal synchronous frequency is 37.879kHz. However, since 1 / 2 dividing are carried out, one period of the pulse signal which a frequency divider 3 outputs becomes about 52.8 microseconds. Moreover, since the pulse width in this case is 8.0 microseconds, the duty ratio of driving pulse Pd is set to about 1:6.6.

[0036] that is, the duty ratio of driving pulse Pd which a waveform shaping circuit 4 outputs serves as about 1 law (the gestalt of this operation before or after 1:7.0) regardless of screen mode, and becomes fixed [the luminescence brightness of the fluorescence tubing 6].

[0037] In addition, the electrical potential difference of the high tension power which the frequency, the pulse width, or the inverter circuit of screen mode (vertical synchronous frequency, horizontal synchronous frequency, the number of vertical dots, or the number of horizontal dots), the division ratio of a frequency divider, and a driving pulse which mentioned as the example and was explained in the gestalt of above-mentioned operation generates, the other details of each circuit section, etc. are examples, and this invention was not limited to these values or circuitry.

[0038] Moreover, fluorescence tubing mentioned as a light emitting device may also be an example, and may be the other discharge tubes.

[0039] Furthermore with the gestalt of above-mentioned operation, the distinction circuit showed the configuration which distinguishes screen mode based on the frequency of a Horizontal Synchronizing signal. However, in addition to this, you may be the configuration to which the signal which shows screen mode from the circuit which generates a video signal is supplied, the configuration to which the signal which shows screen mode from displays, such as LCD connected, is supplied, or the configuration which distinguishes screen mode based on the configuration and signal sequence (pin out) of a connector which connect a display.

[0040]

[Effect of the Invention] As explained above, according to invention according to claim 1, a distinction means distinguishes the gestalt of a video signal, and a pulse generating means is carrying out dividing of the Horizontal Synchronizing signal included in a video signal according to this gestalt, and supplies the driving pulse of about 1 fixed cycle to a high-tension-power generation means regardless of the gestalt of a video signal.

[0041] According to invention according to claim 2, a pulse generating means is changing the pulse width of a driving pulse according to the gestalt of the distinguished video signal, and supplies the driving pulse of a fixed duty ratio to a

high-tension-power generation means mostly.

[0042] according to invention according to claim 3, a distinction means distinguishes the gestalt of a video signal based on the synchronous frequency of a video signal, or the frequency of a Horizontal Synchronizing signal -- it is -- the gestalt of a video signal -- not related -- about 1 fixed cycle -- or the driving pulse of a duty ratio is supplied to a high-tension-power generation means about 1 law.

[0043] According to invention according to claim 4, a division ratio determines that it will become large as the frequency of the Horizontal Synchronizing signal which a distinction means distinguishes the gestalt of a video signal and the video signal concerned includes becomes high, and a pulse generating means is this thing [carrying out division ratio dividing] about the Horizontal Synchronizing signal included in a video signal, and supplies the driving pulse of about 1 fixed cycle to a high-tension-power generation means regardless of the gestalt of a video signal.

[0044] According to invention according to claim 5, a distinction means determines the pulse width proportional to the period of the Horizontal Synchronizing signal by which dividing was carried out in general, and a pulse generating means is generating the driving pulse of this pulse width. Since the driving pulse of a fixed duty ratio is mostly supplied to a high-tension-power generation means Even if the video signal of different synchronous frequency is inputted, it is possible to obtain the synchronizing signal of the inverter circuit of a suitable frequency and the drive power of suitable fluorescence tubing. The burden which an inverter time receives is reduced and the effectiveness that the driving gear and the drive approach of a back light which there is no beat and are turned on by fixed brightness are realizable is acquired.

[Translation done.]